CLAIMS

What is claimed is:

1. A communications system, comprising:

a modulator for modulating a digital data stream onto a carrier wave to generate a modulated signal, the modulator converting data in the data stream into symbols for transmission by the communications system, the symbols being encoded into one of M possible symbols of a M-ary constellation, wherein each symbol is defined by one of a plurality of phases and one of a plurality of magnitudes; and

an amplifier for amplifying the modulated signal prior to transmission to generate an amplified signal, the amplifier having a non-linear characteristic that generates a non-linear distortion in the modulated signal, wherein the M-ary constellation is a 24 point constellation having 16 points defined by a first magnitude and 8 points defined by a second magnitude, wherein the second magnitude is less that the first magnitude.

2. The communications system of claim 1 wherein the amplifier has a gain which differs for each amplitude.

3. The communications system of claim 1 wherein the amplifier has a predetermined, non-linear characteristic and the constellation varies in accordance with the non-linear characteristic.

4. A communications system, comprising:

a modulator for modulating a digital data stream onto a carrier wave to generate a modulated signal, the modulator converting data in the data stream into symbols for transmission by the communications system, the symbols being encoded into one of M possible symbols of an M-ary constellation, wherein each symbol is defined by one of a plurality of phases and one of a plurality of magnitudes; and

an amplifier for amplifying the modulated signal prior to transmission to generate an amplified signal, the amplifier having a non-linear characteristic that generates a non-linear distortion in the modulated signal, wherein the M-ary constellation is a 32 point constellation having 16 points defined by a first magnitude, 12 points defined by a second magnitude, and 4 points defined by a third magnitude, wherein the second magnitude is less than the first magnitude and the third magnitude is less than the second magnitude.

5. The communications system of claim 4 wherein the amplifier has a gain which differs for each amplitude.

6. The communications system of claim 4 wherein the amplifier has a predetermined, non-linear characteristic and the constellation varies in accordance with the non-linear characteristic.

7. A communications system, comprising:

a modulator for modulating a digital data stream onto a carrier wave to generate a modulated signal, the modulator converting data in the data stream into symbols for transmission by the communications system, the symbols being encoded into one of M possible symbols of an M-ary constellation, wherein each symbol is defined by one of a plurality of phases and one of a plurality of magnitudes; and

an amplifier for amplifying the modulated signal prior to transmission to generate an amplified signal, the amplifier having a non-linear characteristic that generates a non-linear distortion in the modulated signal, wherein the M-ary constellation is a 64 point constellation having 24 points defined by a first magnitude, 16 points defined by a second magnitude, 16 points defined by a third magnitude, and 8 points defined by a fourth magnitude, wherein the second magnitude is less than the first magnitude, the third magnitude is less than the second magnitude, and the fourth magnitude is less than the third magnitude.

8. The communications system of claim 7 wherein the amplifier has a gain which is differs for each amplitude.

9. The communications system of claim 7 wherein the amplifier has a predetermined, non-linear characteristic and the constellation varies in accordance with the non-linear characteristic.

10. A communications system, comprising:

a modulator for modulating a digital data stream onto a carrier wave to generate a modulated signal, the modulator converting data in the data stream into symbols for transmission by the communications system, the symbols being encoded into one of M possible symbols of an M-ary constellation, wherein each symbol is defined by one of a plurality of phases and one of a plurality of magnitudes; and

an amplifier for amplifying the modulated signal prior to transmission to generate an amplified signal, the amplifier having a non-linear characteristic that generates a non-linear distortion in the modulated signal, wherein the M-ary constellation is a 64 point constellation having 24 points defined by a first magnitude, 16 points defined by a second magnitude, 12 points defined by a third magnitude, 8 points defined by a fourth magnitude, and 4 points defined by a fifth magnitude, wherein the second magnitude is less than the first magnitude, the third magnitude is less than the second magnitude, the fourth magnitude is less than the third magnitude, and the fifth magnitude is less than the fourth magnitude.

11. The communications system of claim 10 wherein the amplifier has a gain which differs for each amplitude.

12. The communications system of claim 10 wherein the amplifier has a predetermined, non-linear characteristic and the constellation varies in accordance with the non-linear characteristic.

13. A method of encoding data comprising the steps of:

modulating a digital data stream onto a carrier wave to generate a modulated signal, the step of modulating converting data in the data stream into symbols, the symbols being encoded into one of M possible symbols of an M-ary constellation, wherein each symbol is defined by one of a plurality of phases and one of a plurality of magnitudes; and

amplifying the modulated signal prior to transmission to generate an amplified signal, the step of amplifying introducing a non-linear characteristic that generates a non-linear distortion in the modulated signal, wherein the M-ary constellation is a 24 point constellation having 16 points defined by a first magnitude and 8 points defined by a second magnitude, wherein the second magnitude is less than the first magnitude.

14. The method of claim 13 wherein the step of amplifying further comprises varying each magnitude in accordance with the non-linear characteristic.

15. A method of encoding data comprising the steps of:

modulating a digital data stream onto a carrier wave to generate a modulated signal, the step of modulating converting data in the data stream into symbols, the symbols being encoded into one of M possible symbols of an M-ary constellation, wherein each symbol is defined by one of a plurality of phases and one of a plurality of magnitudes; and

amplifying the modulated signal prior to transmission to generate an amplified signal, the step of amplifying introducing a non-linear characteristic that generates a non-linear distortion in the modulated signal, wherein the M-ary constellation is a 32 point constellation having 16 points defined by a first magnitude, 12 points defined by a second magnitude, and 4 points defined by a third magnitude, wherein the second magnitude is less than the first magnitude and the third magnitude is less than the second magnitude.

16. The method of claim 15 wherein the step of amplifying further comprises varying each magnitude in accordance with the non-linear characteristic.

17. A method of encoding data comprising the steps of:

modulating a digital data stream onto a carrier wave to generate a modulated signal, the step of modulating converting data in the data stream into bit symbols, the bit symbols being encoded into one of M possible bit symbols of an M-ary constellation, wherein each bit symbol is defined by one of a plurality of phases and one of a plurality of magnitudes; and

amplifying the modulated signal prior to transmission to generate an amplified signal, the step of amplifying introducing a non-linear characteristic that generates a non-linear distortion in the modulated signal, wherein the M-ary constellation is a 24 point constellation having 16 points defined by a first magnitude and 8 points defined by a second magnitude, wherein the second magnitude is less than the first magnitude.

18. The method of claim 17 wherein the step of amplifying further comprises varying each magnitude in accordance with the non-linear characteristic.

19. A method of encoding data comprising the steps of:

modulating a digital data stream onto a carrier wave to generate a modulated signal, the step of modulating converting data in the data stream into bit symbols, the bit symbols being encoded into one of M possible bit symbols of an M-ary constellation, wherein each bit symbol is defined by one of a plurality of phases and one of a plurality of magnitudes; and

amplifying the modulated signal prior to transmission to generate an amplified signal, the step of amplifying introducing a non-linear characteristic that generates a non-linear distortion in the modulated signal, wherein the M-ary constellation is a 64 point constellation having 24 points defined by a first magnitude, 16 points defined by a second magnitude, 12 points defined by a third magnitude, 8 points defined by a fourth magnitude, and 4 points defined by a fifth magnitude, wherein the second magnitude is less than the first magnitude, the third magnitude is less than the second magnitude, the fourth magnitude is less than the third magnitude, and the fifth magnitude is less than the fourth magnitude.

20. The method of claim 19 wherein the step of amplifying further comprises varying each magnitude in accordance with the non-linear characteristic.